Demystifying Academics to Enhance University - Business Collaboration

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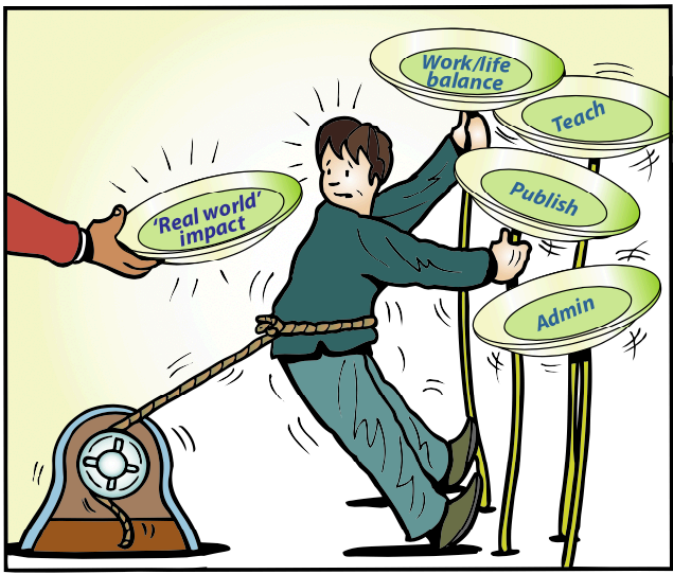


Overview: University-derived research (e.g. science) is useful in 'real world' business applications, so effective collaboration is desirable. However, for work to actually proceed, strategic and policy-level drivers must align with the incentive structures and constraints upon individual university-based scientists and their motivations. This briefing aims to foster collaborations by providing a view from the perspective of individual academics. Specifically, it examines workload (i.e. specified tasks) and incentive structures (i.e. assessment criteria) to tackle two questions: What motivates academics to do specific work? And, reciprocally, what might constrain them? In light of this, specific, pragmatic actions, including short-term and time-efficient steps are proposed in a 'user guide' to help initiate and nurture collaborations. In addition, some modes of institutional support are suggested.

Main Points

- Like other professions, academics suffer time pressure, i.e. amid 20-50 key duties, only *up to* 0.5 days per week might potentially be found for activities with 'real world' impact.
- Typically, for impact-related activities others must be sacrificed (e.g. research), creating a tension.
- As yet, even in countries strongly promoting collaboration, the overriding imperative remains for academics to publish research (i.e. peer-reviewed journal articles).
- Thus, to justify working with business, impact-related work must inspire curiosity and facilitate future novel research (e.g. science) to mitigate this conflict.

Scope

University-business interaction can be in collaborations[1–3] or use other routes (i.e. patenting, licensing, spin-off companies)[e.g. 4–6]. Collaboration considered in this note is the most frequent channel[7,8], and includes joint 'pre-competitive' research that is often subsidised by public funding as well as more heavily directed work (e.g. consulting).

Industry/Business interest

Many business sectors[9] operate more effectively by utilising peer-reviewed research that is primarily created in universities. Illustratively, natural perils (e.g. hurricanes) can cause losses >$100 billion per year[10,11] and modelling these risks is a key part of the global (re)insurance sector's decision-making which, critically, includes university-derived environmental science.

Government & university interest

Globally, political interest in converting research excellence into commercial success[9,12] and societal impact[13] is increasing. However, this conversion is known to be imperfect. So, even in countries where notable efforts are already made (e.g. UK, Australia[14]) a desire exists to improve the flow of science into policy and business decision-making practice through university-business collaborations. Debate continues about how to incentivise, deliver, monitor, and support this flow[9,15].

This study

This study melds objective UK-based data (i.e. 10 job specification and 10 sets of promotion criteria) with the knowledge and experience of two cohorts of university-based scientists. 17 academic and five business-based co-authors contributed their first-hand experience through writing the peer-reviewed paper[15] that this note is based upon. For this, a workshop at NERC's Knowledge Exchange Network (KEN) meeting, 26th June 2018 in Glasgow, analysed the textual data, including six participants from business and 21 from universities.

In total, even only taking participants and co-authors current institutions, data pertaining to 36 of the UK's 164 universities were collected. Thus, a diversity of views was collected relating to the following questions.

- Is time pressure a key constraint limiting university-based researchers' work with business?

- Operationally (i.e. day-to-day) what workload factors restrict time for impact-related work?
- Strategically (i.e. months to years) how are 'real world' impact and collaboration reflected in incentive structures for research staff?
- What intrinsically motivates academics? And, how might alignment with this facilitate university-business collaborations?

Illustrative persona

The persona of a typical, impact inclined, early- to mid-career UK academic (i.e. ~10 years faculty experience) was used to focus this work. This stage is ideal to have established a research track record, yet still be flexible, and be actively seeking to initiate new long-term relationships. Critically, this hypothetical individual's core research relates to the technical capability of the company (e.g. atmospheric science, geology). A genuine interest in impact (i.e. 'real world' change) is assumed, although level of experience in knowledge exchange could vary. Finally, we assume a desire for both a successful career continuing with their university and work-life balance.

Is time pressure a key constraint limiting university-based researchers' work with business?

Conventionally, Intellectual Property (IP) and cultural differences are seen as key barriers to collaboration[16,17], and this is still borne out to some extent by studies that consulted a variety of stakeholders (e.g. universities, SMEs, Trade Associations)[9]. Studies of university-based scientists, however, disagree strongly and suggest limitations on time in a scientist's working day as an important[e.g. 12,18], and perhaps the overriding[17], constraint on university-business collaboration.

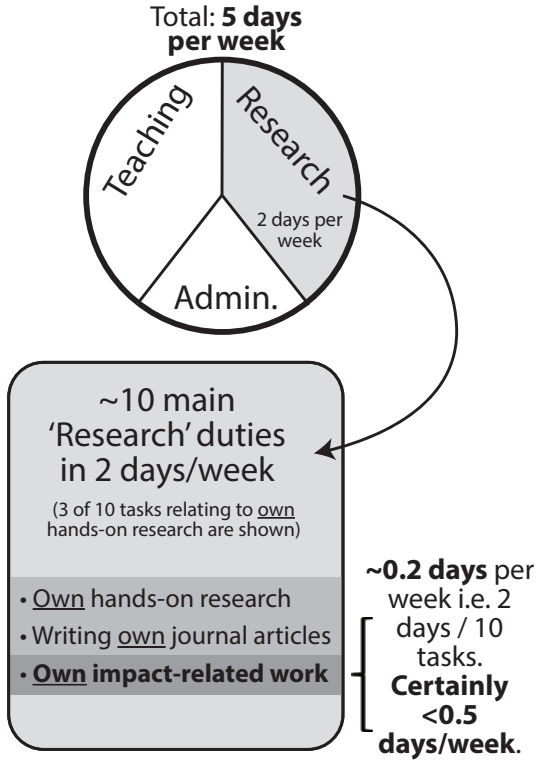
Faculty level participants at the workshop self-reportedly work a mean of 47.9 hours per week (range of 38-70), and during 18.3 weekends per year. This is consistent with the experience and practice of the 17 academic co-authors, and larger studies (>2,000 participants) at ~48 h/w[19,20]. This time at work sets the boundary conditions for accomplishing the tasks required of a university-based scientist (see below). UK academics like other professions often work at weekends, and yet feel under pressure to do more[20]. Thus, even working 45-50 hours per week, it is evident that there is time pressure for a typical university-based scientist in the UK; i.e., there is no spare (i.e. previously un-allocated) time, forming a constraint on collaboration.

Operationally (i.e. day-to-day) what workload factors restrict time for impact-related work?

What creates the pressures on academics' time? Job specifications identify 15 to 52 (median 28) distinct 'key' or 'main' tasks required of a university-based scientist (e.g. PhD supervision, admissions tutor, student/staff recruitment, design & deliver undergraduate courses). These are all time-consuming, and fall broadly in three categories (Fig. 1). However, in addition to these there is an expectation to do numerous other tasks to support their academic reputation, internal visibility and external profile (e.g. organise conferences, external examiner, journal editing, sit on panels assessing funding bids, government committees, treasurer for a learned society).

These day-to-day tasks show that scientists have an array of competing demands upon their time, and so they frame what a typical university-based scientist can do, whatever their underlying desires and motives may or may not be. Specifically, a tension exists between opportunities presented by working with business and non-optional duties (e.g. administration, teaching)

Fig. 1: Potential time availability for collaboration with business, in the context of other duties, of a typical early- to mid-career UK academic.

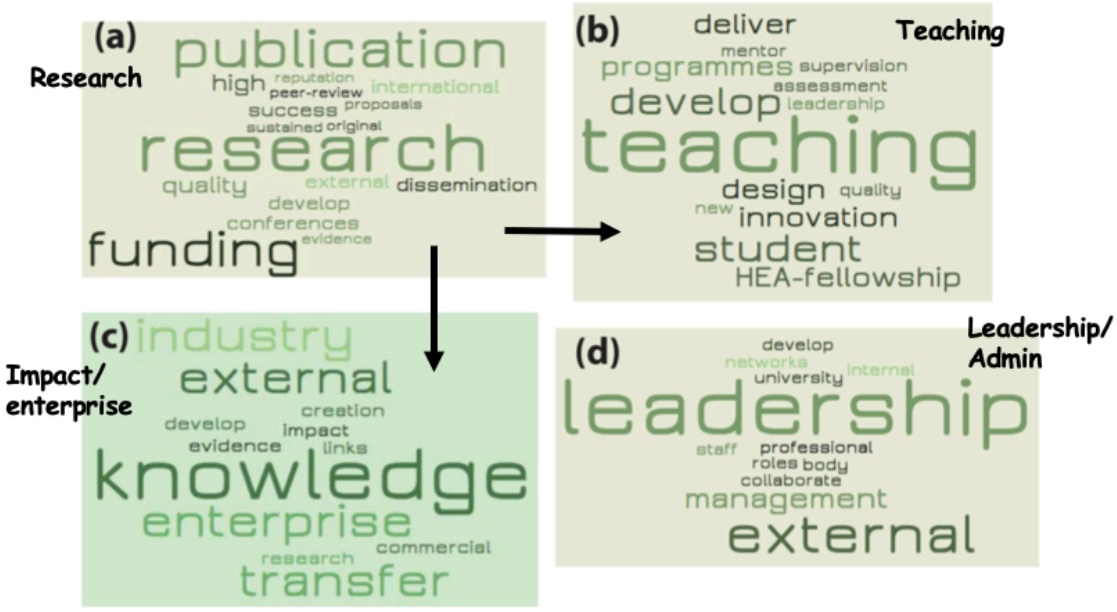


Strategically (i.e. months to years) how are 'real world' impact and collaboration reflected incentive structures for research staff?

Aspirational targets are used to govern academics' appraisal, which are closely aligned to promotion criteria. Derived from thematic analysis, Fig. 2 illustrates the drivers within 4 main areas.

In short, publishing novel science in peer-reviewed journals is the overriding imperative, followed by winning funding to facilitate publications (e.g. by funding a post-doctoral researcher). Teaching and Administration/Leadership are obligatory. Pervasive pressure (i.e. criteria) exists to undertake Impact/Enterprise work, in whichever diverse form, but in practice it remains lower in priority, is not usually obligatory, and is thus best engaged in if reportable outcomes are also aligned with other drivers. It is also critical to note that teaching

Fig. 2: Word clouds illustrating indicative appraisal criteria for an early to mid-career research scientist based in a UK university, as distilled from promotion criteria to Senior Lecturer in the context of co-authors and workshop participants' experience. Arrows indicate dependency i.e. research underpins other activities.



should be 'research informed', and research must create new knowledge to later feed into impact or enterprise activities.

What intrinsically motivates academics? And, how might alignment with this facilitate university-business collaborations?

With basic needs met[21], additional personal financial reward (i.e. 'gold') is of low importance to the great majority of university researchers[1,12,17,22], who do little or no consultancy work; so, for a business, it doesn't matter how much you might be able to pay them to work with you. Persuading the world's best researchers to work with you requires a deeper understanding of what motivates most academic researchers, so this section considers *why* academics' motivations arise and what governs their relative dominance.

We propose impact as a notable addition to prior models[e.g. 22,23]. So, after 'gold' there remain three types of inter-linked motivation (i.e. Fig. 3) influencing our illustrative researcher. Each of these presents an opportunity i.e. how can businesses best access existing knowledge and work with researchers to answer new questions as they arise?

1. *Curiosity and creativity* (a.k.a 'puzzle'[22]) i.e. the satisfaction of a puzzle solved in an innovative way. How can you frame your needs in a way that will pique the curiosity of researchers, challenge them and give them opportunities to conduct creative, original and publishable work?
2. *Impact* i.e. a desire to have an impact and help with societal (e.g. environmental) problems[13] (i.e. 'altruism') or being intrinsically motivated by the act of working with business itself (i.e. 'utility'). How will working with your company give these researchers a unique opportunity to make a difference that is significant and meaningful, and at a scale not otherwise possible?
3. *Career* (a.k.a 'ribbon'[22]): Increasingly, generating such benefits in the real world is now rewarded, with some contribution to winning research funding and promotion. How can you provide evidence of impact from research that can be used by researchers in evaluation exercises?

Diagnostic model of academic behaviour

Collecting together both the constraints and motivations exerting themselves on academics, it is possible to postulate a model claiming a diagnostic understanding of *why* actions are prioritised (Fig. 3). Regarding collaboration there are two key points to note. Firstly, there remains an overriding imperative for academics to publish, and for key assessments (e.g. the REF exercise) impact *must* be based on identified publications. Secondly, reciprocally, effective delivery of science in a collaboration must involve improved actions or decision-making within stakeholders *and* the provision of evidence of this 'impact' back to the scientist[13,15].

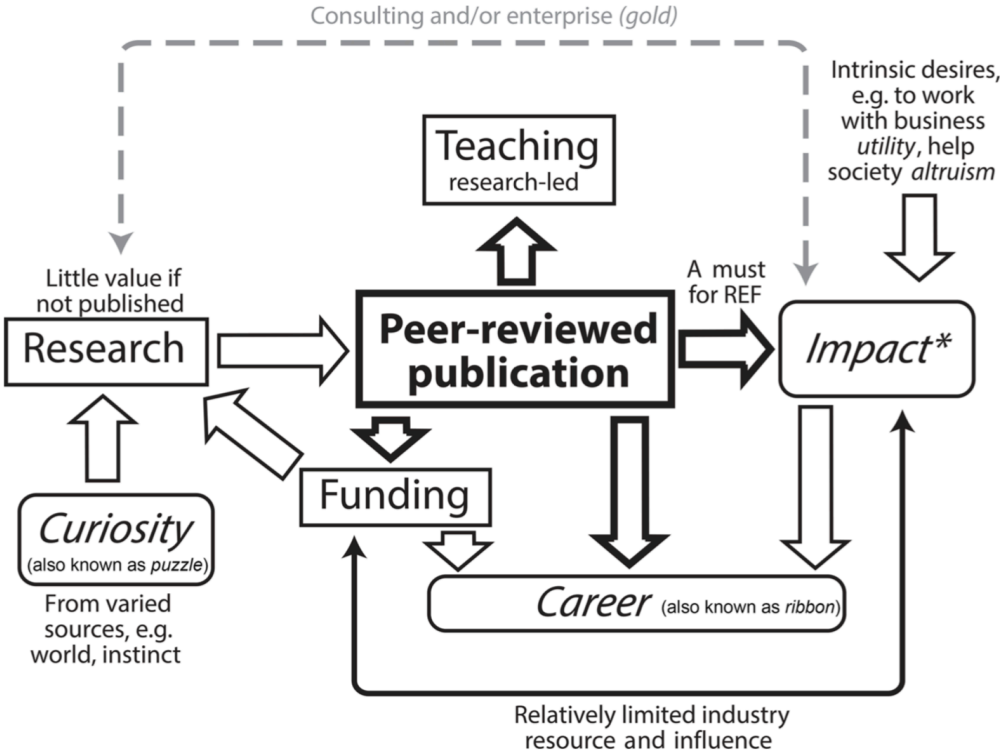
This is internationally applicable and transferable between sectors.

Illustrative 'User Guide' to initiate collaborations

Effective partnerships are mutually beneficial, and likely built on projects that are co-designed in the context of long-term trusting relationships. These, however, must start somewhere. Hillier *et al*. (2019)[15] propose lists of illustrative pragmatic actions to initiate and nurture collaboration that are within the ability of an individual university-based scientist to action. The paper also details *why* they might be effective (e.g. by mapping back to appraisal criteria), to allow business to better evaluate any further collaboration activities they may have in mind. A few possibilities include:

- *Offer a scientist a position on an advisory panel*: The role is a reportable outcome, and even a small remuneration counts as funding income, which can buy a little of a research assistant's time to do a pilot study; these greatly help when

Fig. 3: Model relating academics' motivations (italics) and main duties / appraisal criteria. Bolder, wider, blacker arrows indicate stronger relationships; in short, publication remains paramount. Of the 4 main motivations, 'gold' is not prominent only because this work focuses on the other 3 (i.e. Impact, Curiosity, Career). This builds on previous work by integrating motivations with duties, and by introducing 'Impact' as a motivation and the types of intrinsic desire behind it. * indicates that Impact is both a requirement and a motivation.



writing funding bids for substantive money, ultimately leading to publications.

- *Ask a scientist to provide training*: Relationship building, and potentially some income (rationale as above).
- *Give a scientist access to in-house expertise or data*: May allow a novel insight into a scientific problem, whilst a data-driven pilot study may be of immediate use to a business.
- *Support a funding grant application*: In-kind support and a letter of support is immediately useful with mutual benefit arising through co-design which builds the relationship.
- *Offer funding for limited, highly-applied work*: Useful for appraisals (e.g. funding metric), in the short-term or in parallel with collaboration on more blue-skies work.

Some ways that academics can support their business partner are generic (e.g. literature review, provide training or expert advice), but most will be sector specific and can best be determined by co-designing a project. Both short- and long-term outputs for both parties are desirable.

Illustrative University-based modes of support

In addition to the original study, we broaden the perspective of this note by incorporating views from a conference session at the PraxisAuril 2019 Conference on 13th June entitled 'Supporting Impact and Knowledge Exchange'. This focussed on stimulating supply to satisfy demand in the light of the perspective of individual researchers. From this, illustrative suggestions for modes of institutional (i.e. university) support for collaborations are:

- *Industrial Fellows schemes*: This aims to enhance university capability in KE by recruiting and explicitly supporting academics with strong existing partnerships, and legitimising this as well as integrating it explicitly into the career structure.
- *Removing 'pinch points' in relationship development*: This could be done by professional services (e.g. Business Engagement Team) and removes the demand for the academic to be an expert in all stages of the process. This may involve pro-active and interactive 'match-making'.
- *Facilitating mentoring*: To promote a culture of engagement from within, 'buy-out' or otherwise provide space for academics with experience to help colleagues. This firstly mitigates the impression of an impact agenda imposed by professional services and secondly removes or mitigates fear of the unknown. Thus, it has the potential to allow academics to move more easily outside their comfort zone (e.g. UKRI funding).
- *Reduce Risk:* By diversifying, an institution can effectively permit an academic to explore collaboration options; e.g. if significant time is spent on an applied placement within a company, expectations for publication could be reduced accordingly. Similar might apply to starting 'spin-outs'.
- *Reduce logistical or administrative burden*: Simply, by freeing up time, this will provide space for collaboration. This could be by taking on actions, or by streamlining process (e.g. single point of contact who takes ownership of coordination).

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